BAYOU NEZPIQUE and BAYOU CASTOR TMDLs FOR FECAL COLIFORM

SUBSEGMENTS 050301, 050303

US EPA Region 6

With cooperation from the
Louisiana Department of Environmental Quality
Office of Environmental Assessment
Environmental Technology Division

Final
January 19, 2001

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

Section 303(d) of the Federal Clean Water Act requires states to identify waterbodies that are not meeting water quality standards and to develop total maximum daily pollutant loads for those waterbodies. A total maximum daily load (TMDL) is the amount of a pollutant that a waterbody can assimilate without exceeding the established water quality standard for that pollutant. Through a TMDL, pollutant loads can be distributed or allocated to point sources and nonpoint sources discharging to the waterbody. A TMDL has been developed for fecal coliform bacteria for Bayou Nezpique and Bayou Castor.

Bayou Nezpique, Subsegment 050301, was listed on both the 1998 and the October 28, 1999 Court Ordered §303(d) Lists of impaired water bodies requiring the development of TMDLs. Bayou Nezpique was listed on both the 1998 and the October 28, 1999 Court Ordered §303(d) Lists as not fully supporting the water quality standard for primary contact recreation (swimming) and was ranked as high priority for TMDL development. Bayou Castor, Subsegment 050303 (tributary to Bayou Nezpique), was listed on the Court Ordered 303(d) List for Louisiana's as being impaired by pathogen indicators (fecal coliform). Louisiana's water quality standard for protection of the primary contact recreation use reads as follows:

> "Based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content shall not exceed a log mean of 200/100mL, nor shall more than 10 percent of the total samples during any 30-day period or 25 percent of the total samples collected annually exceed 400/100mL. These primary contact recreation criteria shall apply only during the defined recreational period of May 1 through October 31. During the non-recreational period of November 1 through April 30, the criteria for secondary contact recreation shall apply."

The standard for secondary contact recreation reads similarly:

> "Based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content shall not exceed a log mean of 1,000/100 mL, nor shall more than 10 percent of the total samples during any 30-day period or 25 percent of the total samples collected annually exceed 2,000/100 mL."

Five years (January, 1994 – December 1998) of monthly LDEQ monitoring data on Bayou Nezpique (near Basile, WQ site 005) were assessed to determine if the primary and secondary contact recreation uses were being maintained. Analysis of the data for the November – April season shows that the secondary contact recreation use is being maintained (see Appendix A). Analysis of the data for the May – October season shows that the primary contact recreation use is not protected (see Appendix A). Therefore, a TMDL for Bayou Nezpique will be developed to protect the May – October season.

Fecal coliform data for Bayou Castor was collected from June 1998, - December 1998. Analysis of this data shows that the primary contact recreation use is not being maintained (see Appendix A). Therefore, a TMDL for Bayou Castor will be developed to protect the May – October season.

For the purpose of calculating current loading on Bayou Nezpique the average fecal coliform concentration at LDEQ WQ site 005 for the May – October season was calculated using monthly

LDEQ monitoring data. In Bayou Nezpique, the monthly fecal coliform counts for this season ranged from 17 cfu/100mL to 16,000 cfu/100mL over the 5-year period (January, 1994-December, 1998).

For the purpose of calculating current loading on Bayou Castor the average fecal coliform concentration at LDEQ WQ site 490 for the May – October season was calculated using monthly LDEQ monitoring data. In Bayou Castor, the monthly fecal coliform counts for this season ranged from 9 cfu/100mL to 3,000 cfu/100mL over the collection period (June, 1998 -December, 1998).

For the purpose of TMDL development, the criteria of 200/100mL for the May – October season was applied. A TMDL fecal coliform loading curve for this period (May 1 – October 31) has been generated as Figure 1. This TMDL loading curve was developed using Equation 1, substituting the criteria, 200 cfu/100 ml, for FC concentrations and varying flows. The attempt here is to show that while a TMDL may be expressed as a single point it can also be thought of as a continuum of points representing the criterion value and various flow values. This TMDL fecal coliform loading curve is applicable to Bayou Nezpique and Bayou Castor. An 86% reduction in fecal coliform loading during the May – October season will be needed to protect the primary contact recreation use in Bayou Nezpique. A 70% reduction in fecal coliform loading during the May – October season will be needed to protect the primary contact recreation use in Bayou Castor.

1. Introduction

Bayou Nezpique, Subsegment 050301, was listed on both the 1998 and the October 28, 1999 Court Ordered §303(d) Lists of impaired water bodies requiring the development of TMDLs. Bayou Nezpique was listed on both the 1998 and the October 28, 1999 Court Ordered §303(d) Lists as not fully supporting the water quality standard for primary contact recreation (swimming) and was ranked as high priority for TMDL development. Bayou Castor, Subsegment 050303 (tributary to Bayou Nezpique), was listed on the Court Ordered 303(d) List for Louisiana's as being impaired by pathogen indicators (fecal coliform). TMDLs for fecal coliform bacteria were developed in accordance with the requirements of Section 303 of the federal Clean Water Act. The purpose of a TMDL is to determine the pollutant loading that a waterbody can assimilate without exceeding the water quality standard for that pollutant; the TMDL also establishes the load reduction that is necessary to meet the standard in a waterbody. The TMDL consists of the wasteload allocation (WLA), the load allocation (LA), and a margin of safety (MOS). The wasteload allocation is the load allocated to point sources of the pollutant of concern, and the load allocation is the load allocated to nonpoint sources. The margin of safety is a percentage of the TMDL that accounts for the uncertainty associated with the model assumptions, data inadequacies, and growth.

2. Study Area Description

Water quality segment 0503 is part of the Mermentau River Basin. The Basin encompasses the prairie region of the state and a section of the coastal zone. The drainage area for the Basin, excluding the gulf water segment, is 3,710 square miles. The segment is located in south central Louisiana in the parishes of Evangeline, Acadia, Allen, and Jefferson Davis and has a drainage area of 611.2 square miles. The segment is long and narrow and spans the land uses characteristic of the entire basin. The northern part of the segment is a flatwoods area. The midsection is prairie, characterized by large expanses of flat grassland and scattered areas of oak trees and other mixed hardwoods, and the southern part is marshland. The flatwoods and the prairie are generally considered upland areas while the marshland is considered a coastal area. The slope of the land is generally north to south. Because of its relatively low relief, especially in the prairie and marsh areas, the region is characterized by poor drainage and annual backwater flooding of agricultural lands. The land use in the watershed is summarized in Table 1 (LDEQ, 1993).

Table 1. Land Uses in Segment 0503

LAND USE TYPE	NUMBER OF ACRES	% OF TOTAL AREA
Urban	9,979	1.63
Extractive	123	0.02
Agricultural	318,357	52.07
Forest Land	169,531	27.73
Water	3,312	0.54
Wetland	106,581	17.43
Barren Land	3,282	0.54
Other	224	0.04
TOTAL AREA	611,389	100

2.1 Bayou Nezpique

Bayou Nezpique is located in south central Louisiana and its watershed includes the following tributaries: Beaver Creek, Boggy Bayou, East and West Forks of Bayou Nezpique, Manwell Gully, Grand Louis Bayou, Castor Creek, Bayou Blue, Roger's Gully, Bayou Duralde, Jennings STP Canal, and several unnamed tributaries. The watershed is 611.2 square miles in area. Bayou Nezpique is in the Mermentau River Basin and includes Water Quality Subsegments 050301, 050302, 050303, and 050304.

2.2 Water Quality Standards

The designated uses for Bayou Nezpique and Bayou Castor include both primary contact recreation and secondary contact recreation. Fecal coliform bacteria are the indicator used for the water quality criteria and for assessment of use support. Louisiana's water quality standard for protection of the primary contact recreation use reads as follows:

> "Based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content shall not exceed a log mean of 200/100mL, nor shall more than 10 percent of the total samples during any 30-day period or 25 percent of the total samples collected annually exceed 400/100mL. These primary contact recreation criteria shall apply only during the defined recreational period of May 1 through October 31. During the non-recreational period of November 1 through April 30, the criteria for secondary contact recreation shall apply."

The standard for secondary contact recreation reads similarly:

> "Based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content shall not exceed a log mean of 1,000/100 mL, nor shall more than 10 percent of the total samples during any 30-day period or 25 percent of the total samples collected annually exceed 2,000/100 mL."

2.3 Identification of Sources

The sources identified in the *1998 Louisiana Water Quality Inventory* as affecting the water quality of Bayou Nezpique are minor municipal point sources, minor industrial point sources, agriculture, and silviculture sources (LDEQ, 1998).

2.3.1 Point Sources

There are 25 permitted facilities in Bayou Nezpique, 15 of which are discharging sanitary wastewater into Bayou Nezpique and its tributaries. None of these facilities discharge to Bayou Castor. The combined flow of all discharges to Bayou Nezpique is 2,244,978 gallons per day (See Appendix B).

2.3.2 Nonpoint Sources

The predominant land uses along Bayou Nezpique and Bayou Castor are agriculture and forestry. It is presently unknown to what relative extent these sources contribute to fecal coliform loads. There are also numerous rural residences where domesticated animals may be found. These rural residences may also contribute to the fecal coliform load if they have septic tanks or septic fields for their wastewater treatment.

3. TMDL Load Calculations

3.1 Current Load Evaluation

Fecal coliform loads have been calculated using the instream bacterial counts and the flow of the stream. The following equation can be used to calculate fecal coliform loads.

Equation 1. C x 1000mL/ L x 1 L/0.264 gallons x Q in gallons/day = cfu/day

Where: C = colony forming units/100Ml
Q = stream flow in gallons/day

A traditional expression of the FC loading may be developed by setting one critical or representative flow and concentration, and calculating the fecal coliform load using Equation 1. The difficulty with this approach is in the determination of the appropriate flow or concentration value to use. For the purpose of calculating current loading on Bayou Nezpique and Bayou Castor the average fecal coliform concentration for the May-October season were calculated using monthly LDEQ monitoring data.

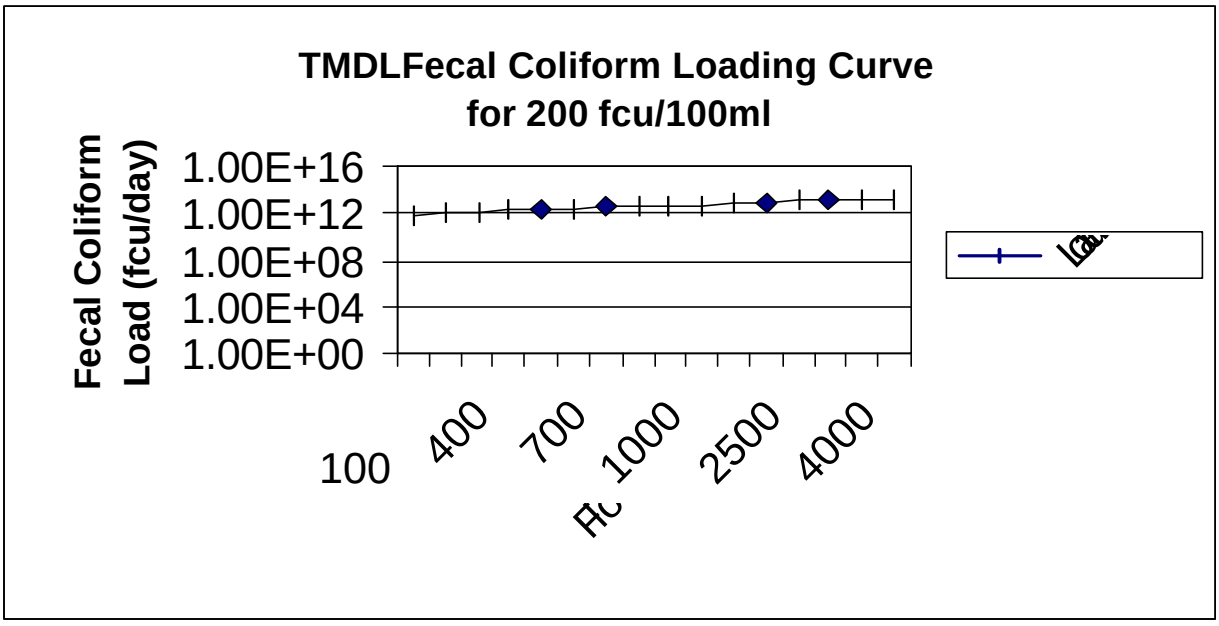
For the purpose of calculating current loading on Bayou Nezpique the average fecal coliform concentration at LDEQ WQ site 005 for the May – October season was calculated using monthly LDEQ monitoring data. In Bayou Nezpique, the monthly fecal coliform counts for this season ranged from 17 cfu/100Ml to 16,000 cfu/100Ml over the 5-year period (January, 1994-December, 1998). The average fecal coliform count for the May – October season is 1392 cfu/100ml (see Appendix A). In addition, the average flow for Bayou Nezpique at Basile for the May – October season is 291 ft^3/sec (see Appendix C). Using these values and Equation 1 it is estimated that the current loading for the May – October season is 9.90 E12 cfu/day.

For the purpose of calculating current loading on Bayou Castor the average fecal coliform concentration at LDEQ WQ site 490 for the May – October season was calculated using monthly LDEQ monitoring data. In Bayou Castor, the monthly fecal coliform counts for this season ranged from 9 cfu/100Ml to 3,000 cfu/100Ml over the collection period (June, 1998 –December, 1998). The average fecal coliform count for the May – October season is 658 cfu/100ml (see Appendix A). In addition, the average flow for Bayou Castor for the May – October season is 17 ft^3/sec (Max Forbes, LDEQ, personal communication). Using these values and Equation 1 it is estimated that the current loading for the May – October season is 2.73 E11 cfu/day.

3.2 TMDL

Point sources usually have a defined critical receiving stream low flow such as the 7Q10 at which the criterion must be met. For nonpoint sources it is recognized that there may be no single critical flow condition. To address this condition, a TMDL fecal coliform loading curve for the recreational period (May 1 – October 31) has been generated as Figure 1. This TMDL loading curve was developed using Equation 1, substituting the criteria, 200 cfu/100 ml, for FC concentrations and varying flows. The attempt here is to show that while a TMDL may be expressed as a single point it can also be thought of as a continuum of points representing the criterion value and various flow values. This curve is not stream dependent but is dependent upon the designated stream criterion. Therefore, it may be applied to both Bayou Nezpique and Bayou Castor. This curve represents the TMDL loading allocation for FC.

Figure 1. TMDL Fecal Coliform Loading Curve for the May – October season.



Utilizing Figure 1 one can select a stream flow and can quickly determine the FC loading value. The line formed by this series of points may be thought of as a boundary. At any given flow the loading may be below the line, within the boundary, or above the line. FC load values falling

above the line represent disproportionately high values relative to the standard. FC load values falling below the line represent low loads relative to the standard. To develop load reductions one simply needs to determine the appropriate flow value (x-axis) and see where it intersects the load allocation line.

The load reduction needed to meet the water quality standard for primary contact recreation in Bayou Nezpique at 291 ft^3/sec is 8.48 E12 cfu/day (86% reduction)[1]. This was obtained by calculating the allowable TMDL at 291 ft^3/sec for the 200 cfu/100ml criterion (1.42E12 cfu/day) and subtracting this load from the observed load (9.90 E12 cfu/day, see Appendix A).

Current Load - TMDL = Load Reduction

9.90 E12 cfu/day – 1.42 E12 cfu/day = 8.48 E12 cfu/day

The load reduction needed to meet the water quality standard for primary contact recreation in Bayou Castor at 17 ft^3/sec is 1.90 E11 cfu/day (70% reduction)[1]. This was obtained by calculating the allowable TMDL at 17 ft^3/sec for the 200 cfu/100ml criterion (8.31E10 cfu/day) and subtracting this load from the current load (2.73 E11 cfu/day, see Appendix A).

Current Load - TMDL = Load Reduction

2.73 E11 cfu/day – 8.31 E10 cfu/day = 1.90 E11 cfu/day

3.3 Wasteload Allocation (WLA)

The Louisiana Water Quality Regulations require permitted point source discharges of treated sanitary wastewater to maintain a fecal coliform count of 200cfu/100ml in their effluent, i.e., they must meet the standard at end-of-pipe. Therefore, there will be no change in the permit requirements based upon a wasteload allocation resulting from this TMDL.

Equation 1 can be used to calculate the total point source load (wasteload allocation) for Bayou Nezpique utilizing a fecal coliform count of 200cfu/100ml and the total volume of all the sanitary wastewater dischargers (2,244,978 gallons/day).

200 cfu/100mL * 1000mL/L * 1 L/0.264 gallons * Q gallons/day = WLA

Where Q = Total volume of sanitary wastewater discharges into Bayou Nezpique

WLA for all dischargers = 1.70 E10 cfu/day

The wasteload allocation for Bayou Castor is zero.

[1] Expression of the load reduction percentage was adjusted since publication of the draft TMDL based on public comment; see EPA's response-to-comments at http://www.epa.gov/earth1r6/6wq/tmdl.htm for further explanation.

3.4 Load Allocation (LA)

The load allocation for each season for a given flow can be calculated using Equation 1 and the following relationship:

(TMDL@ given flow and criterion) - (WLA)= LA

Bayou Nezpique LA

LA for May – October season at an instream flow of 291 ft^3/sec = 1.40 E12 cfu/day

1.42 E12 cfu/day (TMDL@ 291 ft^3/sec) – 1.70 E10 cfu/day (WLA) = 1.40 E12 cfu/day

Bayou Castor LA

LA for May – October season at an instream flow of 17 ft^3/sec = 8.31 E10 cfu/day

8.31 E10 cfu/day (TMDL@ 17 ft^3/sec) – 0 cfu/day (WLA) = 8.31 E10 cfu/day

3.5 Seasonal Variability

Louisiana has established a seasonal water quality standard for bacteria based upon definition of a summer swimming season and winter secondary contact only. In development of these TMDLs data for all seasons were evaluated and it was determined that a TMDL for the May - October season for Bayou Nezpique and Bayou Castor were needed to protect the primary contact recreation use.

3.6 Margin of Safety (MOS)

The Clean Water Act requires that TMDLs take into consideration a margin of safety. EPA guidance allows for the use of implicit or explicit expressions of the margin of safety or both. When conservative assumptions are used in the development of the TMDL or conservative factors are used in the calculations, the margin of safety is implicit. When a percentage of the load is factored into the TMDL calculation as a margin of safety, the margin of safety is explicit. In this TMDL for fecal coliform, conservative assumptions have been used and therefore, the margin of safety is implicit. These conservative assumptions are:

- Using average seasonal flows to calculate current loading to obtain load reduction.
- Treating fecal coliform bacteria as a conservative pollutant, that is, a pollutant that does not degrade in the environment (bacteria do die off in the environment)
- Using the more conservative 200 cfu/100mL standard rather than 400 cfu/100mL for the summer primary contact recreational season.
- Using the design flow of the point source dischargers rather than actual average flow rates, which are typically much lower

4. Other Relevant Information

Although not required by this TMDL, LDEQ utilizes funds under Section 106 of the federal Clean Water Act and under the authority of the Louisiana Environmental Quality Act to operate an established program for monitoring the quality of the state's surface waters. The LDEQ Surveillance Section collects surface water samples at various locations, utilizing appropriate sampling methods and procedures for ensuring the quality of the data collected. The objectives of the surface water monitoring program are to determine the quality of the state's surface waters, to develop a long-term data base for water quality trend analysis, and to monitor the effectiveness of pollution controls. The data obtained through the surface water monitoring program is used to develop the state's biennial 305(b) report (*Water Quality Inventory*) and the 303(d) list of impaired waters. This information is also utilized in establishing priorities for the LDEQ nonpoint source program.

The LDEQ has implemented a watershed approach to surface water quality monitoring. Through this approach, the entire state is sampled over a five-year cycle with two targeted basins sampled each year. Long-term trend monitoring sites at various locations on the larger rivers and Lake Pontchartrain are sampled throughout the five-year cycle. Sampling is conducted on a monthly basis or more frequently if necessary to yield at least 12 samples per site each year. Sampling sites are located where they are considered to be representative of the waterbody. Under the current monitoring schedule, targeted basins follow the TMDL priorities. In this manner, the first TMDLs will have been implemented by the time the first priority basins will be monitored again in the second five-year cycle. This will allow the LDEQ to determine whether there has been any improvement in water quality following establishment of the TMDLs. As the monitoring results are evaluated at the end of each year, waterbodies may be added to or removed from the 303(d) list. The sampling schedule for the first five-year cycle is shown below. The Mermentau River Basin will be sampled again in 2003.

1998 – Mermentau and Vermilion-Teche River Basins
1999 - Calcasieu and Ouachita River Basins
2000 – Barataria and Terrebonne Basins
2001 – Lake Pontchartrain Basin and Pearl River Basin
2002 – Red and Sabine River Basins

(Atchafalaya and Mississippi Rivers will be sampled continuously.)

In addition to ambient water quality sampling in the priority basins, the LDEQ has increased compliance monitoring in those basins, following the same schedule. Approximately 1,000 to 1,100 permitted facilities in the priority basins were targeted for inspections. The goal set by LDEQ was to inspect all of those facilities on the list and to sample 1/3 of the minors and 1/3 of the majors. During 1998, 476 compliance evaluation inspections and 165 compliance sampling inspections were conducted throughout the Mermentau and Vermilion-Teche River Basins.

5. Public Participation

When EPA establishes a TMDL, 40 C.F.R. § 130.7(d)(2) requires EPA to publicly notice and seek comment concerning the TMDL. Pursuant to an October 1, 1999, Court Order, EPA prepared this TMDL. After submission of this TMDL to the Court, EPA commenced preparation of a notice seeking comments, information and data from the general and affected public. Comments and additional information were submitted during the public comment period and this Court Ordered TMDL was revised accordingly. EPA has transmitted this revised TMDL to the Court, and to the Louisiana Department of Environmental Quality (LDEQ) for incorporation into LDEQ's current water quality management plan.

REFERENCES

Forbes, Max, 2000. Louisiana Department of Environmental Quality. Personal communication, February 3, 2000.

LDEQ, 1993. *State of Louisiana Water Quality ManagementPlan, Volume 6, Part A: Nonpoint Source Pollution Assessment Report*. Louisiana Department of Environmental Quality, Office of Water Resources, Baton Rouge, La.

LDEQ, 1998. *State of Louisiana Water Quality ManagementPlan, Volume 5, Part B: Water Quality Inventory*. Louisiana Department of Environmental Quality, Office of Water Resources, Baton Rouge, La.

APPENDIX A Fecal Coliform data and loading calculations for each season.

Bayou Nezpique, at Basile, LA

November - April		FECAL		May - October		FECAL
		COLIFORM				COLIFORM
DATE	TIME	MPN/100ML		DATE	TIME	MPN/100ML
------	----	---------		------	----	---------
04/14/1998	922	300		05/12/1998	930	300
03/10/1998	1023	800		10/14/1997	935	540
02/10/1998	1200	300		08/12/1997	900	17
12/09/1997	940	1600		07/15/1997	1000	50
11/18/1997	1025	240		06/10/1997	900	300
04/15/1997	1015	30		05/13/1997	1050	130
03/11/1997	1040	500		10/15/1996	1030	80
02/18/1997	1035	17		09/10/1996	1020	140
01/07/1997	950	1600		08/13/1996	940	1300
12/10/1996	1050	20		07/09/1996	1017	40
11/19/1996	1000	16000		06/11/1996	1000	40
04/09/1996	1050	1400		05/14/1996	950	500
03/12/1996	1000	170		10/10/1995	1100	170
02/13/1996	1020	40		09/12/1995	1000	110
01/09/1996	1040	300		08/15/1995	1030	800
12/12/1995	1050	3000		07/11/1995	1025	210
11/14/1995	1020	130		06/13/1995	1000	80
04/04/1995	1130	500		05/09/1995	1045	16000
03/14/1995	1020	3000		10/11/1994	1015	40
02/14/1995	1050	3400		09/12/1994	1100	80
01/10/1995	1005	30		08/09/1994	940	1600
12/13/1994	1000	700		07/12/1994	1000	9000
11/15/1994	1035	230		05/10/1994	1023	500
04/12/1994	1115	2400			Average =	1392
03/15/1994	1030	300		% Exceedance of 400/100ml =		35%
02/08/1994	1010	80				
01/11/1994	1020	800				
	Average =	1403				
% Exceedance of 2000/100ml =		19%				
		Flow	Fecal	Flow	Load	
		cfs	Count (fcu)	gal/day	fcu/day	
Current May - Oct Load		291	1392	187741935	9.90E+12	
Allowable May - Oct Load		291	200	187741935	1.42E+12	
% Load Reduction May - Oct		596				

Bayou Castor

November - April		FECAL		May - October		FECAL
		COLIFORM				COLIFORM
DATE	TIME	MPN/100ML		DATE	TIME	MPN/100ML
------	----	---------		------	----	---------
12/15/1998	833	500		10/28/1998	826	900
11/23/1998	825	80		10/13/1998	840	1600
11/09/1998	826	170		09/22/1998	831	80
	Average =	250		09/08/1998	835	9
% Exceedance of 2000/100ml =		0%		08/25/1998	838	80
				08/11/1998	829	70
				07/28/1998	833	50
				07/14/1998	815	3000
				06/23/1998	822	130
					Average =	658
				% Exceedance of 400/100ml =		33%
		Flow	Fecal	Flow	Load	
		cfs	Count (fcu)	gal/day	fcu/day	
Current May - Oct Load		17	658	10967742	2.73E+11	
Allowable May - Oct Load		17	200	10967742	8.31E+10	
% Load Reduction May - Oct		229				

Bayou Nezpique, near Jennings, LA

November - April		FECAL		May - October		FECAL
		COLIFORM				COLIFORM
DATE	TIME	MPN/100 ML		DATE	TIME	MPN/100 ML
------	----	---------		------	----	---------
03/09/1998	920	3000		05/11/1998	955	30
01/12/1998	1000	300		09/08/1997	1015	80
11/18/1997	1022	23		07/14/1997	945	23
03/10/1997	925	30		05/12/1997	1006	11
01/07/1997	945	3000		09/09/1996	1005	70
11/18/1996	1015	5000		07/09/1996	948	8
03/11/1996	910	30		05/13/1996	935	300
01/08/1996	900	700		09/12/1995	1005	40
11/13/1995	905	170		07/11/1995	1025	40
03/14/1995	948	1700		05/09/1995	1010	500
01/10/1995	1010	20		09/13/1994	945	30
11/15/1994	940	17		07/12/1994	920	330
03/15/1994	1010	300		05/10/1994	1005	3000
01/11/1994	1015	23			Average =	343
	Average =	1022		% Exceedance of 400/100ml =		15%
% Exceedance of 2000/100ml =		21%				

APPENDIX B Dischargers in subsegment.

Dischargers to Bayou Nezpique			
Facility	Permit #	Receiving Water	Discharge Flow
			gallons/day
Academy Trailer Park	LAG540033	Bayou Nezpique	13,200
Acadia Feed Lot	LA0034681	Closed	0
Town of Basile	LA0044865	Ditch-Bayou Nezpique	143,871
Town of Basile water treatment plant	WP3204	Permit Voided	0
Town of Elton	LA0061719	Bayou Blue - Bayou Nezpique	107,097
Shop Rite #3	WG-040114	Bayou Nezpique	0
Crooked Creek Rec. Area	LAG540293	Bayou Nezpique	18,250
Reddell STP	LA0109452	Bayou Nezpique	34,193
Evangeline Refining Co	LA0006424	No Discharge	0
North Mamou Subdivision	LAG560049	Grand Louis Bayou	18,065
Gold Line Refining	LA0054640	Bayou Nezpique (int. stormwater)	0
Howell Petroleum	GP8710	No Discharge	0
Hathaway High School	LAG540397	Bayou Nezpique	11,000
City of Jennings	LA0041769	Ditch-Bayou Nezpique	849,677
City of Jennings water treatment plant	WP4398	Bayou Nezpiqe (backwash not included in flow)	0
Bayou Nezpique Rest Area	LAG560109	Bayou Nezpique	25,000
Town of Mamou	LA0020125	Bayou Grand Louis - Bayou Nezpique	600,000
ML Mayfield Petroleum	GP9717	No Discharge	0
City of Oakdale	LA0033430	Beaver Creek-Boggy Creek- Bayou Nezpique	225,806
Town of Oberlin	LA0020087	Bayou Blue - Bayou Nezpique	160,000
Village of Pine Prairie	LA0079057	Ditch-Boggy Bayou	37,419
Pool-Holston Inc.	LA0079936	No Discharge	0
Prairie Manor Nursing Home	WP1245	Connected to Village of Pine Prairie	0
Rice Bran and Oil	LA050301	Tip Top Canal - Bayou Nezpique	1,400
Sklar and Phillips Oil Company	GP9128	No Discharge	0
		total	2,244,978

APPENDIX C Flow calculation methodology.

January 27, 2000

DETERMINATIONS OF AVERAGE STREAMFLOW FOR SELECTED LADEQ WATER QUALITY STATIONS IN LOUISIANA.

Note: *The* "average streamflow" is defined to be the annual average streamflow.

Bayou Des Cannes northeast of Jennings (DEQ # 0308 and 0647) - Based on the runoff for the USGS station on Bayou Des Cannes near Eunice, 2.11 CFS per square mile, and a drainage area for the 308 site of 368.69 square miles, the average streamflow is estimated to be 778 CFS. . The May - October average flow is estimated to be about 73% of the annual average flow; the November - April average flow is estimated to be about 127 % of the annual average flow.

Bayou Nezpique at La. 104 north of Basile (DEQ 005) -- Based on the runoff for the USGS station on Bayou Nezpique near Basile, 1.89 CFS per square mile, and a drainage area for the 005 site of 327.62 square miles, the average streamflow is estimated to be 619 CFS. . The May - October average flow is estimated to be about 47% of the annual average flow**;** the November - April average flow is estimated to be about 153 % of the annual average flow.

Bayou Nezpique at La. 97 near Jennings (DEQ 309) -- Based on the runoff for the USGS station on Bayou Nezpique near Basile, 1.89 CPS per square mile, and a drainage area for the 309 site of 580 square miles, the average streamflow is estimated to be 1,096 CFS. The May - October average flow is estimated to be about 47**%** of the annual average flow-, the November - April average flow is estimated to be about 153 % of the annual average flow.

Bayou Nezpique at boat landing near Jennings (DEQ 651) - Based on the runoff for the USGS station on Bayou Nezpique near Basile, 1.89 CFS per square mile, and a drainage area for the 651 site of 585 square miles, the average streamflow is estimated to be 1, 106 CFS. The May - October average flow is estimated to be about 47**%** of the annual average flow; the November - April average flow is estimated to be about 153 % of the annual average flow.

Bayou Plaquemine Brule at Refinery (DEQ 650) - Based on the runoff for the USGS station on Bayou Des Cannes near Eunice (best available estimator), 2.11 CFS per square mile, and a drainage area for the 650 site of 331.87 square miles, the average streamflow is estimated to be 700 CFS. The May - October average flow is estimated to be about 73% of the annual average flow; the November - April average flow is estimated to be about 127 % of the annual average flow.

DETERMINATIONS OF AVERAGE STREAMFLOW FOR SELECTED LADEQ WATER QUALITY STATIONS IN LOUISIANA PAGE 2.

Bayou Boeuf at mouth (DEQ 668) - Based an the runoff for the USGS station an Bayou Courtableau near Washington, 1.56 CPS per square mile, and a drainage area for the 668 site of 234.33 square miles, the average streamflow is estimated to be 312 CFS. The May - October average flow is estimated to be about 53% of the annual average flow; the November - April average flow is estimated to be about 147% of the annual average flow.

Bayou Teche at Breaux Bridge (DEQ 03 1) -- Based on the adjusted runoff for the USGS station on Bayou Teche at Arnaudville and a subtraction of the estimated average flow for Bayou Fusilier, the estimated average streamflow is 760 CFS. The May - October average flow is estimated to be about 76% of the annual average flow; the November - April average flow is estimated to be about 124 % of the annual average flow.

Bayou Teche at Adeline (DEQ 030) – With the assumption that the average streamflow for the USGS station on Bayou Teche at Keystone Lock and Dam is the same as the average streamflow at Adeline, the estimated average streamflow for Site DEQ 030 is 491 CFS. The May-October average flow is estimated to be about 78% of the annual average flow; the November-April average flow is estimated to be about 122% of the annual average flow.

Vermilion River at Perry (DEQ 001) – Based on DEQ determinations for Vermilion River at Surrey Street in Lafayette using USGS data for the period 94-97, the average flow for the Vermilion River at Perry is about 750 CFS. For May-October, the average flow is estimated to be about 600 CFS; for November- April, the average flow is estimated to be about 900 CFS.